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ABSTRACT

Issues and problems associated with university involvement in public sector activities and the knowledge transfer process are examined. After a brief statement of the state-of-the-art in knowledge transfer, attention is directed to one of the basic issues presented in the literature: the appropriateness and inappropriateness of university involvement in public service. An opinion favoring a more responsive stance on the part of universities was interpreted from the literature. The academic community and nonacademicians have suggested that the university is a source of knowledge needed for decision-making in various kinds of action programs. Consideration is given to types of knowledge, since there are conceptual variations regarding the product(s) that universities have to offer to the public. Various knowledge transfer models are compared, and a composite knowledge transfer model that utilizes concepts from these models is examined. The basic thrust of the composite model is the concept of university-user partnership as proposed by Moe (1977). Two basic functions of the model are a clearinghouse function within the university and a linking function. Both of the basic functions of the model can be made operational through a relatively small organizational structure (e.g., the community services office). To facilitate the operation of this office, a needs assessment methodology is offered--the Social Mapping Matrix Assessment (SMMA), which can be used for inventory purposes to identify on-campus resources, such as institutes, and the types of services they can provide. A second use is a type of catalog for use by university sub-units and clients. Steps that would bring this model to an action stage are briefly considered. (SW)

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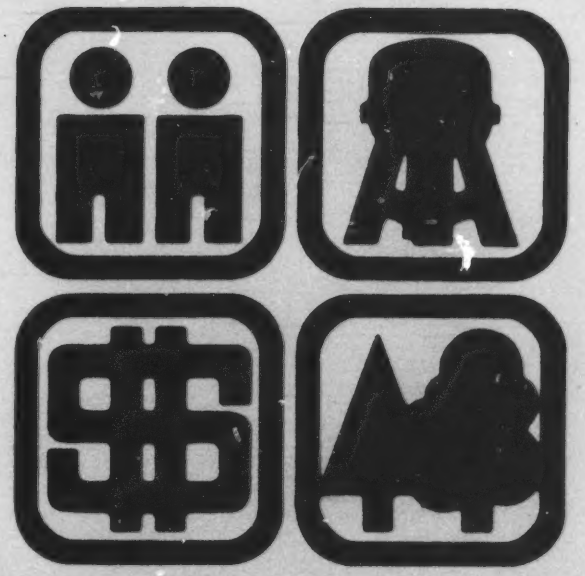

SYNTHESIS

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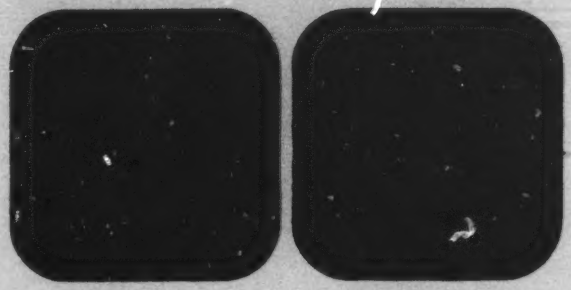

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This publication represents the research time and resources of Dr. Frank M. Howell, Dr. Carlton R. Sollie and their associates working as members of the Southern Rural Development Center Functional Network on Providing Operational Research for Community Decision Makers. Dr. Sollie, a rural sociologist at Mississippi State University, has served as Center Associate for this network since May 15, 1979. The ultimate objective of the network is to provide materials useful to educators, researchers, action agencies and lay citizens' groups in relation to the subject of university participation in public affairs.

This network is only one of many networks established by the SRDC to inventory the current state of knowledge in high-priority areas of rural development. These networks and individual research projects of the Southern Center are designed to provide information and assistance to extension and research staffs throughout the South as they respond to rural development needs in local communities.

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The Southern Center is jointly sponsored by Mississippi State and Alcorn State University and provides support staff for capacity building and innovative programming for the experiment stations and extension services of 28 land-grant universities in 13 Southern states and Puerto Rico.

William W. Linder

William W. Linder
Director
Southern Rural Development Center

UNIVERSITY KNOWLEDGE/TECHNOLOGY TRANSFER AND PUBLIC DECISION-MAKING
REVIEW, SYNTHESIS, AND ALTERNATIVE MODELS

Carlton R. Sollie
Center Associate

Frank M. Howell
Post Doctoral Fellow

(Now Assistant Professor of Sociology
at Texas Christian University, Fort Worth, Texas)

S R D C Functional Network

Mr. John D. Albritton	of	Mississippi State University
Mr. Tony Byrne		Natchez, Mississippi
Dr. Thomas Handy		Mississippi State University
Dr. Daryl Hobbs		University of Missouri
Dr. Frank M. Howell		Mississippi State University
Mr. Bob W. Pittman		Jackson, Mississippi
Mr. Donald L. Pounders		Mississippi State University
Dr. Carlton R. Sollie		Mississippi State University

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TABLE OF CONTENTS

Foreword i

Chapter 1. Knowledge Transfer: The State of the Art 1

Chapter 2. Types of Knowledge 11

Chapter 3. Knowledge Transfer: Models 17

Chapter 4. A Composite Knowledge Transfer Model 30

Chapter 5. Universities and Client Systems: A Methodology for Assessing Knowledge-Transfer Relations 34

Chapter 6. Knowledge Transfer: An Overview and Suggestions for Implementation 49

References 54

Research Projects of the SRDC 58

Board of Directors 60

FOREWORD

This report is the culmination of an extensive, but not exhaustive, review of a large and varied body of literature. It is the second of two reports focusing on a subject that is becoming a matter of growing interest in academic and other circles. The subject is university participation in public affairs, and it is treated in the literature from a variety of perspectives. Different viewpoints are expressed about the appropriateness of university involvement in various kinds of public sector activities, and much has been written about strategies and techniques for involvement.

Involvement of universities in public service activities is not of recent origin; land grant universities in particular have a long history of responding to various needs in the field of agriculture through "mission-oriented" research and knowledge dissemination through the Cooperative Extension Service. Growth of interest in public service activities, however, is occurring in other components of university structure. Stimulating this growth are pressures both internal and external to the university, pressures in the form of increasing expectations by the public and in the form of interest of academicians in being more responsive to societal needs and problems for which their capabilities in research, teaching, and service are relevant.

The first report in this series is an annotated bibliography, the product of a Southern Rural Development Center Functional Network, entitled "University Knowledge/Technology Transfer and Public Decision-Making." As the title implies, much of what appears in the literature about university involvement in public service pertains to the transfer of knowledge from

universities to various user publics, including local governments, public and private agencies, organizations and other groups as well as individuals. There seems to be a voracious appetite for knowledge and a very strong interest in the application of scientific knowledge to various types of problems. This interest is expressed by people in and outside of academe, from university presidents to individual farmers with relatively small operations.

The purpose of this report is to provide an overview of issues and problems associated with university involvement in public sector activities and the knowledge transfer process. Chapter 1 begins with a brief statement of the state-of-the-art in knowledge transfer and continues with an identification and discussion of one of the basic issues as it is presented in the literature, i.e., the appropriateness and inappropriateness of university involvement in public service. The subject of Chapter 2 is types of knowledge. The need for examination of this component of the knowledge transfer process is based on the fact that there are conceptual variations regarding the product(s) that universities have to offer to the public. Chapter 3 describes various knowledge transfer models, pointing out similarities, differences, and problems. In Chapter 4 we present a composite knowledge transfer model which utilizes concepts from models described in Chapter 3. Offered in Chapter 5 is the Social Mapping Matrix, developed by the authors using their home university as a base. The Matrix is a tool, adaptable to different models and to different universities. The report concludes with a general summary and some suggested operational steps.

CHAPTER 1

KNOWLEDGE TRANSFER: THE STATE OF THE ART

Introduction

Knowledge transfer as a process can range in complexity from a simple factual statement made by one person (who knows the fact) to another person (who does not know it) all the way to the complex system of formal education. With such a broad range, any literal attempt to describe the state of the art of knowledge transfer would be a task of gargantuan proportions. Not only is the range of immense proportions, but knowledge is also of different types. Machlup (1963: 21-22) uses five broad categories in his discussion: (1) practical, (2) intellectual, (3) small-talk and pastime, (4) spiritual, and (5) unwanted. Another classification by Machlup (1962: 17), on the other hand, lists (1) scientific and historical, (2) general-abstract and particular-concrete, and (3) analytical and empirical. Machlup's are but two of many classifications. Ruesch (1975) differentiates between knowledge in action and knowledge in general, while other writers discuss basic knowledge and applied knowledge.

In addition to the problem of classifying knowledge, methods of transferring knowledge are many and varied, also ranging in complexity from a single spoken work to technical manuals prepared for a very limited and highly trained audience, for instance, space exploration technicians and theorists, to the widely disseminated versions of Einstein's theory of relativity.

Much is said to be known about knowledge transfer.[1] The state-of-the-art of knowledge transfer, however, insofar as it is documented in the literature, can best be described as mixed. Different writers emphasize

different aspects of the process, and there is no clearly articulated or widely accepted set of concepts.

Given the scope and complexity of the subject, preparation of a comprehensive state-of-the-art report looms as a formidable undertaking. If certain restrictions are imposed on the undertaking, however, the task becomes more manageable. That is, adoption of a less comprehensive perspective recasts the undertaking into a conceptual framework that allows for preparation of a more focused report. That is the approach used here; the perspective is one that restricts attention to a single, but primary, source of knowledge--institutions of higher learning. The perspective is further restricted by excluding knowledge transfer as it occurs in classrooms on campus and by focusing attention on the public service role of those institutions.

Operating from this restricted perspectives does not result in a truly comprehensive state-of-the art report, but it does have advantages. First, it allows a detailed examination of an important part of the knowledge transfer process in American society. Second, it has the advantage of timeliness with respect to a growing movement and commitment in higher education.

Universities and Public Service: For and Against Involvement

Involvement of universities in public service activities of various kinds is becoming more and more a matter of both interest and action. The literature is rich with two main types of material pertaining to this topic. One type is dialectical, dealing with the role of institutions of higher learning with respect to societal needs and problems - i.e., the question of whether these institutions should devote more of their resources to a public service function. The traditional view of this role, the so-called "ivory tower," is being subjected to pressures that are pushing these institutions toward more direct participation in various kinds of activities of a public service nature. Illustrative of the dialectical material in the literature are views expressed by:

Commager (1965: 79)

> The university is, next to government itself, the chief servant of society, the chief instrument of social change. It occupies something of a symbolic role of both the church and the state in the Old World, but it fills a role which neither church nor state can effectively fill; it is the source, the inspiration, the powerhouse, and the clearinghouse of new ideas.

Perkins (1966: 7)

> Knowledge acquired must be transmitted, or it dies. Knowledge acquired and transmitted must be used, or it becomes sterile and inert.

Birenbaum (1969: 71)

> . . . Traditional notions about scholarly detachment, the meaning of "objectivity," the necessity for a disconnection between academic thought and social action, old ideas about how the human learns, the retreat from the streets of the city into the superblock campuses, the ways talent may or should be used--all of these and more deserve an intensive, fresh look . . . The university can no longer avoid the risks of taking positions on the conduct and goals which it has chosen to wheel and deal. Indeed it has no choice about this. So long as it chooses to wheel and deal in the maintenance and extension of its own power, it takes risks--whether it consciously supports and approves the status quo or not. The twilight of an older academic era cannot be conjured away. The sun has set. No critiques of the

> American university can go far in the absence of a confrontation with the society in which the academic institution is a power partner.

Mayhew (1968: 3)

> When an institution is unresponsive to the fundamental demands and needs of its society, it loses its vitality and becomes irrelevant.

Nash (1973: 143)

> There really is no debate about whether institutions of higher education should be involved in the urban crisis--all the prominent people who have discussed the subject agree that they should be.

Perkins (1973: 255)

> Consultation and public service activities of the university are now part of the increased interdependence of our institutions that provides much of the dynamic energy that our intellectual growth brings to our society. Teachers who are involved in research or public service are needed to understand, explain, and help manage an increasingly complex society.

McComas (1980)

> There will be greater involvement in public service activities. Comprehensive universities in general and land-grant universities in particular will become increasingly involved in community planning, the improvement of governmental units and planning, energy efforts, environmental problems, economic development, and continuing education in a broad range of areas. To his credit, our Governor appears to have a broader vision of what our universities can contribute to the state in a variety of public service areas. I hope that we can make a pronounced contribution to the state and at the same time develop a new appreciation of an additional support for higher education.

On the other side of this question the position reflected by the annual faculty conference of the University of California in 1964 as reported by Long (1977: 78). The conference went on record as resisting "pressures to commit its resources to special public service activities." Further, suggestions were made that some of the existing public service activities such as agricultural extension and applied research facilities at Los Alamos and Livermore be separated from the university. Arguments favoring elimination of public service activities from "the spectrum of university

activities are based on academic and ideological values" (Perkins, 1973: 253). Inability to defend its neutral stance vis-a-vis social structures and processes while serving some public service is one of the key arguments against public service. There is, also, some doubt in the minds of anti-involvement proponents about the benefits of public service, especially to students and faculty not directly involved in providing the services.

Long (1977: 77) summaries the arguments:

> Now, many people both inside as well as outside the university have come to think of it largely as a staging ground for a multiplicity of activities more or less educational: as an instrument for action rather than as an institutional organism with its own integrity.
>
> At the same time, a number of professors concerned about classroom instruction and their own research find that this extension of the service idea goes against their grain. Some are simply reluctant or disinterested in responding to new clientele; others are actively hostile to university commitments to action beyond experimental research. With so much knowledge, as many needs and problems requiring knowledge, and so many demand for service, how much is too much? How much is too little? What kind of service is appropriate? Who should decide--and by what criteria?
>
> As a result, the current era may be a critical transitional period in the long-term evolution of the public service mission of American universities. The tension between institutions and their sponsors is increasing. Community groups and government leaders, on the one hand, hold broad expectations of the role universities should play in serving the public, while the universities, on the other hand, often have more limited vision of their responsibilities. These differences require resolution.

According to Moe (1978), American colleges and universities are caught in the confluence of two sets of forces, internal and external, both exerting pressures to become involved. The major internal force is described as "the basic design of our publicly-supported colleges and universities with their functions grounded in the function of knowledge itself, i.e., acquisition and discovery of knowledge in research, transmission of knowlege in teaching, and application and utilization of knowledge in public service-extension" (p. 24).

Important as an external force is the growing notion that institutions of higher learning should respond to the demands and needs of society for help in the alleviation or solution of various kinds of problems. These demands on the resources of colleges and universities, particularly researchers, are partially seen in requests from various decision-makers for help in problem definition, development planning, program implementation, identification and assessment of alternative courses of action, and in evaluation of programs and projects.

Counteracting these forces are various conditions and circumstances; some identified by Moe (1978: 24-25) are as follows:

- o lack of a system which effectively links users (of knowledge) and researchers, including a clear definition of who the users are;
- o mutual suspicion and distrust between researchers and decision makers on policy program;
- o researchers designing research projects without direct contacts with potential users, and frequently with little information on their views of what the problems are;
- o users not aware of what research is available, and not having had a voice in the formulation of the problems researched;
- o difficulties researchers face in accepting the fact that from a user point of view partial information available at the time of action or decision is better than complete information after that time;
- o lack of appropriate, periodic research information releases and publications for users;
- o failure of researchers and research units in universities to follow up significant relationships and exchanges that are initiated with users;
- o failure to provide technical and educational assistance to users for interpretation of findings and for adapting them for research which has not been made a built-in, continuing part of the program development and evaluation processes; and
- o lack of a broad-based public education program which builds public literacy about social policy issues, policy alternatives, and improvement of programs and services.

Although the issue is not settled, it is apparent that increasing pressures and expectations are indeed pushing universities toward increased levels of involvement in public service activities of various kinds. The basic question is now one of strategy, the manner and style of involvement that would be most effective for any given university whether the interest of the university is in rural or urban crises, educational services, community development, energy conservation efforts, environmental problems, or continuing education.

One suggestion, recommended as a partial and long-range answer to the question, is the creation of a new discipline, the "science of knowledge utilization." Institutionalization of this new science, according to Havelock (1971: 1-2) will require "organizational bases, university-linked centers, research and teaching faculties and departments focusing on the study of utilization." Associated with these requirements would be the development of a crops of dissemination and utilization consultants and change agents and the creation and maintenance of communication channels. The time required for this kind of response to the question argues strongly against it as the only effort by the university to expand and strengthen its public service mission. Alternative models that can be more rapidly operationalized must be designed if the university is to achieve a response-to-needs capability that allows it to become "the chief servant of society" not only with respect to the production of knowledge but also with respect to the transfer of usable knowledge and the delivery of services to those who need them for various purposes, including problem-solving and development planning.

A major question facing those universities interested in enhancing their service role is one of definition, i.e., what activities can be

designated as legitimate parts of the public service role? Durward Long, Vice President for Academic Affairs at the University of Hawaii and formerly Vice President for extended academic and public service programs for the University of California system, has offered the following categories of public service activities (1977: 82):

- o Dissemination of knowledge beyond the campus.
- o Delivery of instructional programs beyond the campus.
- o Applied research for immediate public problems.
- o Sharing of resources, including facilities and instructional and other learning resources and personnel.
- o The development of public policy issues and alternatives.
- o Public participation in cultural, esthetic, and other university activities.
- o Community development and community problem solving.

This list encompasses a broad array of different types of activities, at least some of which probably can be found at most universities.

The transfer of knowledge as one component of the service role of universities has been the subject of much research.[2] The literature is rich with material pertaining to this subject, but little attention has been given to the question of how a university can organize itself to expand, facilitate, and enhance its function as a resource system. Havelock states that "special sub-systems in contemporary society specialize in the production, certification, and storage of knowledge. . ." (1971: 3-10). These sub-systems usually take the form of university is a bastion for new ideas, it is also a prison consisting of imbedded norms and values designed and maintained to protect systematically the purity of "basic"

science. Of course, there are exceptions, and the agricultural-agribusiness-rural life component of land grant institutions is a shining example of these exceptions. It is probably accurate to say that most universities are engaged in the transfer of knowledge and the performance of service roles of various kinds. It probably is equally accurate, however, to say that the optimum utilization of the university as a coherent and effective resource system for society has yet to be realized.

Knowledge, as stated earlier, is of different types. Universities are complexly organized and capable of producing, collating, storing, and transferring knowledge of different types in different ways. Knowledge producing institutions under some pressure and with some commitment to increase contributions to the public sector through knowledge transfer need to be aware of conceptual problems associated with their product: knowledge. The following chapter summarizes some of the material in the literature about types of knowledge.

NOTES

1. Machlup's treatment of knowledge production and distribution in the United States is one of the most comprehensive in the field.
2. Rural sociologists are leaders in the study of diffusion and adoption of new ideas and recommended practices and technologies. See Everett M. Rodgers, Diffusion of Innovations. New York: The Free Press of Glencoe, 1962.

CHAPTER 2

TYPES OF KNOWLEDGE

An overview of the knowledge transfer process as it is described in the literature reveals some variance in terminology. In their comparison of social and organizational change models Sashkin, Morris, and Horst (1973) identify the product being transferred as information; but little attention is given to the type of information that, in their terms, "flows" through various channels to an ultimate user of consumer. In Havelock's (1971: 8-1) extensive work, the question is asked: "What knowledge? What range of phenomena deserve the label 'knowledge' or 'scientific knowledge' or 'innovation'?" The term adopted by Havelock to define the product is message, suggesting an emphasis on communication. Ruesch (1975: 289) writes of knowledge in action as a "living model, located inside the organism, that enables the individual to plan action and to steer movements while he carries them out."

When production of knowledge is viewed from the standpoint of those who produce it, it is possible to identify several different types. Znaniecki (1940) focused on different roles of "the man of knowledge" and concluded that many types and forms of knowledge may be produced through specialization of roles, even within a given field of knowledge production. Included in his list of roles of "the man of knowledge" are inductive theorists, discovers of facts, popularizes, historians of knowledge, fighters for truth, contributors, systematizers, discoverer of truth, sages, technological experts, and technological leaders. In a somewhat similar view, Paisely (1969: 15-22; 1968: 3-6) asserted that the types of knowledge produced differ with respect to the system in which the scientist functions as a producer of knowledge. Influencing the type of knowledge he produces

are his culture, his political system, legal/economic system, formal information system (libraries, journals), professional membership groups, formal work organization, his reference group(s), work associates, and his own cognitive structure. Not mentioned by Paisley is the role played by the scientist's general values and his normative orientations within his discipline.

Machlup (1962: 15), in one of the most comprehensive works on knowledge production and utilization, states that "classifications are said to make little sense unless it is stated what purpose they are to serve." He then proposes his own classification scheme consisting of five classes or types:

- o Practical: knowledge that is useful to man in his work, his decision, and his actions.
- o Intellectual knowledge: that which satisfies intellectual curiosity.
- o Small-talk and pastime knowledge: That which satisfies nonintellectual curiosity or desire for light entertainment and emotional stimulation.
- o Spiritual knowledge: related to religious knowledge of God.
- o Unwanted knowledge: outside his interest, usually accidentally acquired, aimlessly retained.

Taking the position that "most information is used as a means to some decision-making," Downs (1957: 215) classified all information as production information, consumption information, or political information, or any combination of these, depending on how it is used.[1] Although he differentiates between contextual knowledge and information,[2] he treats them as one type with reference to decision-making. Rational decisions, according to Downs, can only be made when the decision-maker knows three things: what his goals are, alternative ways available or open to him to

achieve goals, and probable consequences of alternatives.

Classification of research, a knowledge producing process, as either basic or applied is a convention of long-standing and one that is relevant to this report. Writing from the perspective of message content, information flow from one system to another, Havelock (1971: 2-38) offers the following definitions:

> o Basic Research Output
>
> Basic research generates "basic" knowledge in the form of theories, laws, and classifications which underly the masses of empirical phenomena of our world. But the basic researchers do more than provided these general principles: they also give us the empirical data on which these principles are based and the methods by which such data are collected.
>
> o Applied Research and Development Output
>
> Applied research gives us the same types of information, theories, data, and methods, but in a form which is classified to correspond to broad areas of human and social need (e.g., health, welfare, education). From applied research and development we also get prototypes of new products and services, working models and "inventions", which the practitioner can adopt and adapt to his own special circumstances.

Distinctions between basic and applied research output are not as clear-cut as they might seem to be. Havelock (1971: 8-2) stated that he and his co-workers ". . . found it very difficult to draw the line between information which is and is not scientific." It is also noted that when knowledge "moves from the hands of the scientist - creator to the hands of the various others who 'use' it, it seems to go through a kind of metamorphosis; the form change." Havelock (1971: 8-2) states further:

> Thus, what may have been a basic law to a physicist becomes an operational guideline to an engineer; and what was a theory of personality to the academic psychologists becomes a theory of psychotherapy in the clinic. Theories become models and models become products.

In his Editor's Introduction, Rich (1979: 327-337) states that the use of knowledge is affected by two main factors, the type of information produced (e.g., social indicators, consultant reports, surveys, program evaluation) and the sector/policy areas in which the information is being applied.

Lying somewhere between basic and practice knowledge is knowledge that has characteristics of both; it is knowledge resulting from "applied research and development," described by Havelock as "knowledge in evolution" (1971: 8-11). It is knowledge that is "on its way" to becoming usable. "On its way" is depicted by Havelock as an information or knowledge flow beginning with (1) basic knowledge types which are transformed into (2) applied research and development types which are transformed into (3) practical knowledge types which are finally transformed into (4) user message types.

What happens to knowledge - the "message" - as it flows from producer to user depends upon several factors. Machlup (1962: 32-33) identifies six types of knowledge communicators and explains how messages can be modified.

> A transporter will deliver exactly what he has received, without changing it in the least; for example, the messenger carrying a written communication.
>
> An original creator, although drawing on a rich store of information received in messages of all sorts, adds so much of his own inventive genius and creative imagination, that only relatively weak and indirect connections can be found between what he has received from others and what he communicates.
>
> An analyzer uses so much of his own judgement and intuition in addition to accepted procedures, that the message which he communicates bears little or no resemblance to the messages received.
>
> A transformer changes the form of the message received, but is not supposed to change its contents; for example, the stenographer receiving a message in sound, changing what she hears to penciled shorthand notes and then to a typed letter, which she dispatches.

> A processor changes both form and contents of what he has received, but only by routine procedures which subject different pieces of knowledge received to certain operations, such as combinations, computations, or other kinds of rearrangements, leading to definite results, independent of the processor's tastes, moods, or intuition, dependent solely on conventions concerning such processing rules; for example, the accountant receiving separate debit and credit advices, which he combines in definite ways to prepare balance sheets and income statements.
>
> An interpreter changes form and contents of the messages received, but has to use imagination to create in the new form effects equivalent to those he feels were intended by the original message; for example, the translator of a subtle speech or sensitive poetry in a foreign language.

These knowledge communicator types may also be viewed as social roles of those who deal with knowledge. As treated in the literature, roles of "knowledge dealers" include facilitator, encourager, organizer, evaluator, and others. Typically, these specific roles are identified as functions of the more general role of change agent.

Some will argue that all knowledge is useful, and the argument is difficult if not impossible to refute. The ultimate criterion of usefulness, however, as viewed from the perspective of this report is acceptance and application or use by clients.

Knowledge may be transferred from universities to users in various forms. A consultant may carry it "in his head" to a user. A researcher may collect, analyze and interpret data, and report his results in person or in writing. A data bank technician may extract computerized information and forward it to a client. Publications of various kinds may be distributed through institutionalized channels. Workshops, seminars, short courses and institutes may be scheduled both on and off campus. Television, radio, and other media may be used. In all cases knowledge is the commodity that is being transferred.

Systematic ways for transferring knowledge as they are described in the literature are discussed in the following chapter. These systematic ways are defined as knowledge transfer models.

NOTES

1. Downs excludes "entertainment" information from types of knowledge needed by decision-makers.
2. Contextual knowledge is that which "illuminates the basic causal structure of some field of operations," while information "provides current data on variables in the field."

CHAPTER 3

KNOWLEDGE TRANSFER: MODELS

The second main type of material in the literature is found under different labels--planned change, knowledge transfer, diffusion, dissemination, communication, linkage, applied research, public service, and others. Much of this material deals with techniques, procedures and models--ways of transferring information that would be useful to universities interested in providing various kinds of help and in promoting the use of research findings as decision-making input as well as the use of research as a tool for problem definition, program planning, and evaluation.

Also included in this body of literature are numerous examples and case studies of university involvement in many different kinds of public service activities. Among the case studies are those reported by Nash (1973: 26). About the University of Chicago, Nash writes:

> The university has become involved in a number of programs in the Woodlawn area . . . Key ingredients in this story have been pragmatic, forceful leadership both at the Universtiy of Chicago and in the Woodlawn organization.

Other institutions of higher learning about which Nash wrote are Southern Illinois University, University of California at Los Angeles, Morgan State and Our Lady of the Lake. Also included in his collection of case studies were chapters about Northeastern University, Columbia, and Wayne State University contributed by other writers.

One entire issue of Rural Development Research and Evaluation was devoted to university responses to community needs (Volume 3, No. 3, Fall 1979). A special issue of The American Behavioral Scientist (Volume 22, No. 3, January-February, 1979) was published in recognition of "the importance of examining all aspects of knowledge development--creation, diffusion, utilization" (p.327).

Glaser (1978: 50) writes in general terms about ways of moving mountains toward the Mohammeds who do not seem motivated to go and explore them. In this report he summarizes "some strategies and techniques for facilitating knowledge transfer and planned change" (p. 48). He likens the transfer of research findings to users to a "good marriage," implying effective reciprocal relationships between knowledge producers and knowledge users.

LINKAGES

Perhaps the most useful concept in examinations of knowledge transfer is the term "linkage." It is as Havelock (1971: 7-1) states:

> Any detailed consideration of the dissemination and utilization of knowledge must sooner or later focus on the question of linking roles. Who sees to it that knowledge gets to the user? Who is charged with the responsibility of retrieving basic or applied knowledge, deriving practical implications from it, and distributing it to people who need it and can use it?

Implied in Havelock's question is the existence of a gap between the producer of knowledge and the user of knowledge; it is identified by Havelock as "the knowledge gap," a sort of "no-man's land" where neither the scientist as producer nor the client as user feels comfortable. The uneasiness felt by producers and users in this no-man's land is based on the fact that the two social systems differ in terms of values, languages, rules, norms, communication patterns, perceptions, and expectations.[1]

To overcome the knowledge transfer obstacles found in the knowledge gap, it has been suggested that the two systems--producer and user--should be "linked." Aveni (1978: 185), writing of organizational linkages and resource mobilization, asserts that "the concept of linkage can also be extended to ties between organizations and groups and individuals in the society." With respect to knowledge transfer from colleges and universities to client systems, the rise of linkages has a history of success reaching as far back as the creation of the Cooperative Extension Service in 1914.

More recently, the linkage concept was expanded to produce new occupational roles as a means of extending educational benefits to larger number of clients; this role is defined variously as paraprofessional or Extension Aide.

A detailed treatment of the concept of linkage in Eaton (1972: 23-24) identifies and describes four types of linkages:

- o Enabling linkages: with organizations and social groups which control the allocation of authority and resources needed by the institution to function.
- o Functional linkages: with those organizations performing functions and services which are complementary in a production sense, which supply the inputs and which use the outputs of the institution.
- o Normative linkages: with institutions which incorporate norms and values (positive or negative) which are relevant to the doctrine and program of the institution.
- o Diffused linkages: with elements in the society which cannot clearly be identified by membership in formal organization.

In his review of the literature, Havelock (1971: 7-4, 4a) found nine different "knowledge linking roles."

- o Conveyor: to transfer knowledge from producers (scientists, experts, scholars, manufacturers) to users (receivers, clients, consumers).
- o Consultant: to assist users in identification of problems and resources, to assist in linkage to appropriate resources; to assist in adaption to use: facilitator, objective observer, process analyst.
- o Trainer: to transfer by instilling in the user an understanding of an entire area of knowledge or practice.
- o Leader: to effect linkage through power or influence in one's own group, to transfer by example or direction.
- o Innovator: to transfer by initiating diffusion in the user system.

- o Defender: To sensitize the user to the pitfalls of innovations, to mobilize public opinion, public selectivity, and public demand for adequate applicatons of scientific knowledge.

- o Knowledge-builders as Linkers: to transfer through gatekeeping for the knowledge storehouse and through defining the goal of knowledge utilization.

- o Practitioner as Linker: to transfer to clients and consumers through practices and services which incorporate the latest scientific knowledge.

- o The User as Linker: to link by taking initiative on one's own behalf to seek out scientific knowledge and derive useful learnings there from.

Another typology is found in Sashkin, Morris, and Horst (1973: 520) consisting of three types: input-linking, throughput-linking, and output-linking. Change agents are viewed as being involved in all three types, playing the roles of consultant, trainer, and researcher. As a consultant, the change agent may link external information sources to a client system, diagnose client system needs, or recommend uses for knowledge. These are input-linking activities. Throughput-linking involves the change agent in training activities to help clients in various ways with respect to knowledge use. As a researcher, the change agent is involved in output-linking. Included are such activities as helping clients evaluate effects of knowledge use and evaluating the process of change. New information resulting from input- and throughput-linking activities is translated into general knowledge for knowledge banks, thus making it available to others.

It is apparent that such linkages are important. They are, as Aveni (1978: 186) states, "central to resource mobilization." For an organization such as a university to perform its public service role in a continuing and effective manner, linkages are necessary. They bridge the

so-called "knowledge gap" (Havelock, 1971: 7-1) by inserting intermediaries who are specialists in the linking process between the university as a knowledge storehouse and knowledge-producing organization and various client systems.

MODELS

Knowledge transfer models, as they are described in the literature, emphasize different aspects of the knowledge production and utilization process (Sashkin, Morris and Horst, 1973). In their discussion of "phase models of diffusion and change," Havelock and his colleagues identify three "schools of thought" which are described in detail. The social interaction school of thought or perspective focuses on the receiver of knowledge, his perception and response to knowledge coming to him from a source outside himself. Application of knowledge, as viewed by contributors to the social interaction perspective, is primarily a function of interaction among individuals for whom an indentifiable product or recommended practice is relevant. Adoption (use) of the product or practice is seen as the fifth phase of the process that begins with awareness, and much of what is in the literature focuses on those phases (Lionberger, 1960; Rodgers; 1962; Wilkening, 1953; Beal, Rodgers and Bohlen, 1957). Detailed treatment of this process by these writers does not preclude an interest in structures and mechanisms through which the innovations are transmitted, but, as Havelock states, "S-I researchers assume the existence of a diffusable 'innovation' as a precondition for any analysis of the diffusion process."

The second school of thought analyzed by Havelock and associates is labeled "the research, development, and diffusion perspective." It

is best exemplified in the field of agriculture where it has been successfully applied for more than a half century by land grant institutions, i.e., Agricultural Experiment Station research and Cooperative Extension Service. It is a more comprehensive model than the social interaction model, partly because it covers a wider range of roles, relationships and activities. Analysis of the production and diffusion process begins at an earlier time with research. Theorists who function in this school of thought place heavy emphasis on the planning of change on a large scale. There is, however, an assumption on the part of these theorists that "users are passive consumers; if the new knowledge or innovation is presented over the 'right' channel of communication, in an appropriate way, at the proper time, the user will accept it" (Sashkin, Morris, and Horst, 1973: 511). This assumption results in an inadequate treatment of what the social interaction theorists emphasize, the role and function of the knowledge user. The model has also been described as "over-rational, over-idealized (and) excessively research oriented" (Havelock, 1969: 11-17).

Another form of knowledge transfer is that in which a user of knowledge, faced with a problem or need, utilizes resources outside himself to solve the problem or meet the need. This knowledge transfer model is defined ast he "problem-solver perspective." The transfer of knowledge may be initiated by the user or by outside resources, usually referred to as "change agents." Unlike the social interaction and the research, development, and diffusion models which include users of knowledge as "target systems," the problem-solver model treats users as "client systems." This is an important difference because relationships between producers and users as clients implies a collaborative arrangement. The problem-solver model has a strong user orientation, but the use of knowledge is only

a part of the problem-solving process.

Typical of problem-solver model is the process of planned change described in detail by Lippit, Watson, and Westley (1958). Their analysis of the knowledge utilization process includes seven phases beginning with the development of a need for change and concluding with termination of the change. The role of scientific knowledge in the problem-solving model may be of several different types, including theory, research findings, or methodology; but use of such knowledge is not always a necessary part of the planned change process. This is seen as a weakness of the model with respect to utilization of outside resources. In addition, there is "excessive strain on the user" (Havelock, 1972: 11-14), a criticism that is based on suspicion that the average user lacks sufficient creativity in problem-solving.

Whereas the problem-solver model emphasizes the solution of specific problems and creating specific changes, the action research model, although derived from the work of Lewin (1947a, 1947b, 1948) (as is the planned change model of Lippit, Watson, and Westley) is primarily a process model. That is, it focuses on the development of ability within the client system to diagnose problems, plans, and implement changes. The model consists of two research phases and one action phase. The first research phase includes data gathering, analysis and diagnosis followed by the action phase-planning and implementation of an action project or program. The final phase is evaluation (research) of the results of the action program to provide information for further diagnosis and action. This three-phase process is seen as a continuous cycle, providing a general model for problem solving and change within the system. Linkage with outside systems, particularly knowledge-producing systems, is seen as a part of the structure

of the model and is based upon a concern for "research knowledge that can be added to the general fund of behavioral science knowledge and then be put into practice by other applied behavioral scientists in new situations" (Sashkin, Morris, and Horst, 1973: 516).

Similar to the action research model in some respects is the institution building model, developed by a group of scholars concerned with the training of development specialists to work in developing countries (Eaton, 1972). The model is described as "a generic model of induced change . . ." (Siffin, 1972: 43). The emphasis of the model is not on knowledge production, transfer, or utilization specifically; instead, it focuses on the building of viable and effective organizations which can serve as vehicles for promoting the adoption of innovations and the use of new knowledge. In this sense, institution building is appropriate for any form of "non-coercive social innovation in any sector of society in any culture at any time" (Esman, 1972: 21). While the action research focus is on existing systems, the institution building focus is on creating new institutional structures or reconstituting existing structures as a strategy of directed social change. Shortcomings of the model are described by Siffin (1972: 51-52):

- It is a static model . . . in the sense that it identifies a set of topical areas without (a) saying how they are interrelated, or (b) saying what to do about the respective categories.
- It is an a priori model, i.e., not dervied from or built upon a large number of cases or experiences, but upon a synthesis or lessons learned from pragmatic experience and sociological concepts.
- It is, in one sense, a conservative model, i.e., it does not promise success in dealing with any of a broad class of situations even though it does claim to offer a valid and useful view of those situations.

Viewed from a sociological perspective, the institution building model is a tempting device. Directing attention as it does to the institutionalization of a process involving induced change, it offers producers, transmitters, and users of knowledge an efficient means for each to expedite achievement of his goals through the establishment of more or less permanent reciprocal relationships. This is similar to what happens in Phase 6 of the Lippit, Watson, and Westley model (1958); that is, "procedural change may become institutionalized because it is supported by structural change" (p.141). It can be utilized with respect to client system capacity building (in this sense it is similar to the action research model) and for "quick and useful" studies of issues and problems faced by decision-makers, i.e., "brush fires," to use the Rodgers and Linder (1980: 3) terminology.

Pointing out that "universities have the resources to tackle a multitude of local problems, to propose alternative courses of action, to develop solutions, and to improve the management capabilities of local governments," Rodgers and Linder (1980: 4) then present three examples of "university/local collaboration," or institution building.

Pennsylvania State University's Title V efforts emphasize capacity building in local communities for working in rural development. Interaction between local community people and Penn State researchers results in application of a problem-solving process designed by local people themselves. Functioning as a linkage between local community residents and university researchers is a Community Development Specialist who plays a number of roles including "educator, meeting organizer, motivator, expert, researcher, objective third party, and a consultant with access to technical information" (Rodgers and Linder, 1980: 8). Structurally, the Title V program is

organized with joint staff appointments with the Departments of Rural Sociology and Agricultural Economics and the Cooperative Extension Service.

Innovative and in an experimental stage is the Community Technology Initiatives Program (CTIP). It is national in scope and focuses on "strenthening local government capabilities" through a "technology transfer system which will bring current information to bear of local problems" (Rodgers and Linder, 1980: 9). The innovative element of this model is the circuit riding technology agent; in effect, he performs a linking role between local governments and "broad based resources of the Federal government, industry, universities, and other units of government in the United States" (Rodgers and Linder, 1980: 9).

Another model that focuses on local governments as client systems is represented by the Center for Government Technology located at Mississippi State University and operated as a component of the Cooperative Extension Service (Rodgers and Linder, 1980). The program activities in the Center include:

> Training for Mississippi city clerks, assessors, and tax collectors; seminars on local government financial management, county records management, road maintenance, computer procurement, and personnel administration; workshop for members and trustees of school boards, school attorneys, superintendents of schools, mayors, and newly elected supervisors; and training seminars on jail operations and guidelines for handling inmates (p. 9).

As a component of the Cooperative Extension Service, the Center is capable of prompt response to lcoal requests for assistance. Functional issue area specialists and generalists trained to provide technical assistance work cooperatively in the Center's programs.

The interventionist model (Argyris, 1970) concentrates on internal changes in an organization. Not knowledge transfer from one system to

another, but knowledge flow within a system is the focus of this model. In this sense, the interventionist model is similar to other models that emphasize increasing client system capabilities to generate and use problem-relevant data. The goal of the interventionist is not to "implement specific 'content' decisions or changes," but "to alter the basic processes of information flow and data use within the client system" (Sashkin, Morris and Horst, 1973: 514).

The final model to be discussed is significantly different in one important aspect from other models.[2] It utilizes the so-called team approach, the team consisting of representatives of various disciplines who collaborate in a highly intensified effort in cooperation with and in response to requests for help from local decision-makers. It is not solely the team approach that makes the model unique, but the fact that the client system is involved in a partnership type of operation for overall planning and implementation of a research/action project. It also demonstrates how university resources--professional expertise--can be organized for a public service activity.

S.T.A.T. (Small Town Action Team) is the name adopted for the interdisciplinary team. Working with the community, the team's purpose is to stimulate thought, focus attention, create an awareness of issues and opportunities, and make recommendations for action. The model calls for a very intensive work session typically lasting from a Friday through a Monday, although the process varies as widely as the communities it serves. Essentially, the process follows a series of steps consisting of:

- Introduction of team members to community leaders at an informal meeting.

- o Physical overview of the community by air, bus, foot, boat.
- o Meetings with community leaders and resource people.
- o Meetings with citizen groups.
- o Preparation of reports, including drawings and words.
- o Production of reports.
- o Press conference.
- o Final presentation.
- o Report distribution.
- o Follow-up planning.

Representing sociology on S.T.A.T., the senior author of this report was associated with representatives of architecture, landscape architecture, urban planning, political science, and economics. S.T.A.T. was sponsored by the local Chamber of Commerce whose president was an architect. The Chamber, along with other Civic organizations, provided room and board for S.T.A.T. members, all of whom worked without remuneration. With the exception of the economists, all S.T.A.T. members were from university departments.

Initiation of the S.T.A.T. effort was by architects, and there was a relatively heavy physical design emphasis. However, the team's report and final presentation covered a broad array of perceptions and interpretations.

S.T.A.T. was a variation of the Regional/Urban Design Assistance Team (R/UDAT) formula (See R/UDAT Handbook published by the American Institute of Architects, January 1980). Two advantages of this model are its inter-disciplinary approach and its on-site work arena. There are also disadvantages. To the "non-visualist" members of the team, the time available for data collection is less than satisfactory and provisions for follow-up are lacking.

NOTES

1. D. C. Phillips (December 1980: 19) describes part of this problem as follows:

   "There is a gap between the world of fundamental research in the sciences and the everyday world in which human activity takes place. The researchers use sophisticated techniques and their world is a theoretical one in which findings do not automatically apply to the everyday world because everyday terms do not appear in their theories; links of some sort have to be established."

2. This description is based upon the senior author's participation as a team member in a recent effort to help a small town identify needs and problems and create a data base for formulation of projects and programs.

CHAPTER 4

A COMPOSITE KNOWLEDGE TRANSFER MODEL

Because knowledge transfer models described in the literature emphasize different aspects of the knowledge production, transfer, and utilization process, it is difficult to compare them with respect to their potential for enlarging a university's public service role. Sashkin, Morris, and Horst (1973) rated the "action-research" model as the "most complete and sophisticated" of the five models they compared, but they acknowledge neglect of "important dimensions of the models, along which comparisons and contrasts could be drawn" (p. 510). Their rating of the models is based on three research activities which they define as "of primary importance: evaluation of the effects of knowledge use; evaluation of the model itself and the change agent's actions within the model; and research on change in general, on the processess and problem of change" (p. 520).

Moe's (1978) seminal paper, focusing on the concept of "partnership," offers a perspective that recognizes the values associated with institutionalization of organizational linkages and interaction between producers and users of knowledge. This perspective is not restrictive; that is, it allows for variations in structural arrangements within the university setting. As Moe points out, a university interested in expanding its service role can strengthen or establish working relationships with client systems. Viewing the university as a parent unit on one side of the model, one can identify a number of sub-units: colleges, departments, research institutes or centers, and service organizations such as the Cooperative Extension Service and Divisions of Continuing Education. It probably is the case that these sub-units, some of which are more relevant to the

university's service role than others, are operating at levels compatible with resources available for public service activities and that enlarging the university's contribution to the public sector would require additional resources or reallocation of available resources.

Since there are various sub-units that exist as a starting point, some type of knowledge transfer and service delivery coordinating mechanism apparently might be the most appropriate model. Such a model--an appropriate title might be Community Services Office[1]--that performs two basic functions would be a viable option for universities desiring to achieve coherency, effectiveness, and efficiency in the performance of their service role. One of the basic functions is a clearinghouse operation that is simply an information exchanging process within the university. It would include receiving from the distributing to the various sub-units information about their knowledge producing and knowledge transfer capabilities and activities. This process would involve no great amount of paperwork; nor would it require a large number of reports from any one sub-unit. That is, it would be internally efficient.

Information received by the Community Services Office could be coded for computerized data bank storage, and associated retrieval procedures and software could be established for rapid search and retrieval of resource information relevant to various client system needs.

The second basic function of the model is a linking function. It is the key element of the model because the development of workable university-user partnership rests upon the successful linking of the two entities (Moe, 1978). The role of the Community Services Office in the linking process would vary with respect to different university sub-units and with different client systems. It would be inappropriate for the

Office to inject itself into an established university-user relationship, but given the number and variety of client systems and the changing needs and problems of the public sector, there should be many opportunities for the Office to assist in the development of linkages.

Activities of the Community Services Office could include (but not necessarily be restricted to) some of those listed by Moe (1978: 25):

- o Contacts with various public sector agencies, organizations, and groups in order to identify potential partnership members.
- o Interpreting to the public and to users the university's research role and functions.
- o Helping identify development and policy issues from the user point of view involving researchers, research administrators, department heads and other college or university administrators.
- o Assist in the planning and scheduling of various kinds of liaison between university sub-units and a variety of users. In this regard, it might be appropriate to consider the establishment of new types of university-user advisory and technical groups. Consideration might also be given to having persons from user groups in liaison capacity on campus for extended periods of time.
- o Helping define user needs for continuing communication and how various media might be used to transfer research findings to users.

These activities can be classified as coordinative, facilitative, and linking functions. They may also be viewed as developmental and maintenance functions. The linking role of the Office can be operationalized by instituting a "circuit rider" process similar in operation to the way that concept is defined in the Community Technology Initiatives Program. The primary responsibility of the circuit rider would be to help maintain university/user relationship and to service client systems in various ways. In this sense, the role of the circuit rider is similar to that of the Community Development Specialist role as described in Pennsylvania State University's Title V program (PENNTAP).

NOTES

1. Hilton T. Bonniwell, Dean of Continuing Education at Mississippi State University, speaks of the Office of Campus Resources in MSU Memo, Vo. 4 (No. 5) October, 1980, indicating that "in some places it's called community services, or the non-instructional programming office." He points out that "it's around almost everywhere in some form."

CHAPTER 5

UNIVERSITIES AND CLIENT-SYSTEMS: A METHODOLOGY FOR ASSESSING KNOWLEDGE-TRANSFER RELATIONS

It is taken as given that a concern with the "problem" of the knowledge producer and user linkage is compatible with a parallel interest in somehow making the transfer process more efficient. Indeed, our reference to Moe's recent writing (1978) suggests that a confluence of forces internal and external to the primary producer of knowledge, the university, will continue to force this issue into the forefront of discussions about contemporary higher education.

With this acknowledgement aside, we attempt to move toward a more agnostic position in this chapter. In following basic evaluation research perspectives (e.g., Weiss, 1972), we develop the notion that for any model to be rationally devised to coordinate knowledge-transfer at the grassroots level, it should be based on an empirical awareness of the existing relations between the university (producer) and its clients (user).

In this chapter we overview some observations on the social organization of both universities and their client-systems, develop a simple methodology for empirically assessing knowledge-transfer relations, and give a few brief hypothetical examples of how this method might actually be implemented.

The Macrosystem of Knowledge-Flow

Knowledge and technology flow from producers (in our case, universities) to consumers in an institutional framework that can be viewed as having sub-systems. Havelock (1971) presents a detailed analysis of the "macrosystem of knowledge-flow" in which he describes the components of these

sub-systems. The macrosystem consists of both mainstream and subsidiary channels which connect: (1) the university, (2) the scientific professions, (3) the practice profession, (4) the product organizations, (5) the service organizations, (6) the consumer organizations, (7) the government, and (8) the media. Figure 1 presents an adaptation of this conceptualization.

While we do not attempt to further address this macrosystem in this chapter, it is important to our immediate task. All of the non-university components in this macrosystem framework can be considered client-systems for the knowledge/technology "wares" of the university. It is important to the development of a needs assessment methodology for determining knowledge-transfer relations to understand the sheer complexity of this institutional framework. There is also much overlap in these components as, for instance, a given consumer can be a member of a service or product organization, and so forth. The main point of the discussion is this: "clients" and "client-systems" are relatively fluid. They may vary by university (private vs. public, land grant vs. non-land grant, etc.), geographical proximity (rural vs. urban setting) or even temporally (ad hoc clients or systems). Thus what we utilize as concrete examples here are by no means firm models at all. They are presented as illustrative of the nature of knowlege-transfer system that we are addressing.

Social organization of universities as Knowledge/Technology Producers

The myriad interactions implied by this institutional framework would appear almost to defy even description. However, what we propose is that it is indeed possible to describe the "producer" (university) - "user" (non-university) linkage. Moreover, it is preferable to do so before attempting to decide upon, and certainly before implementing, a

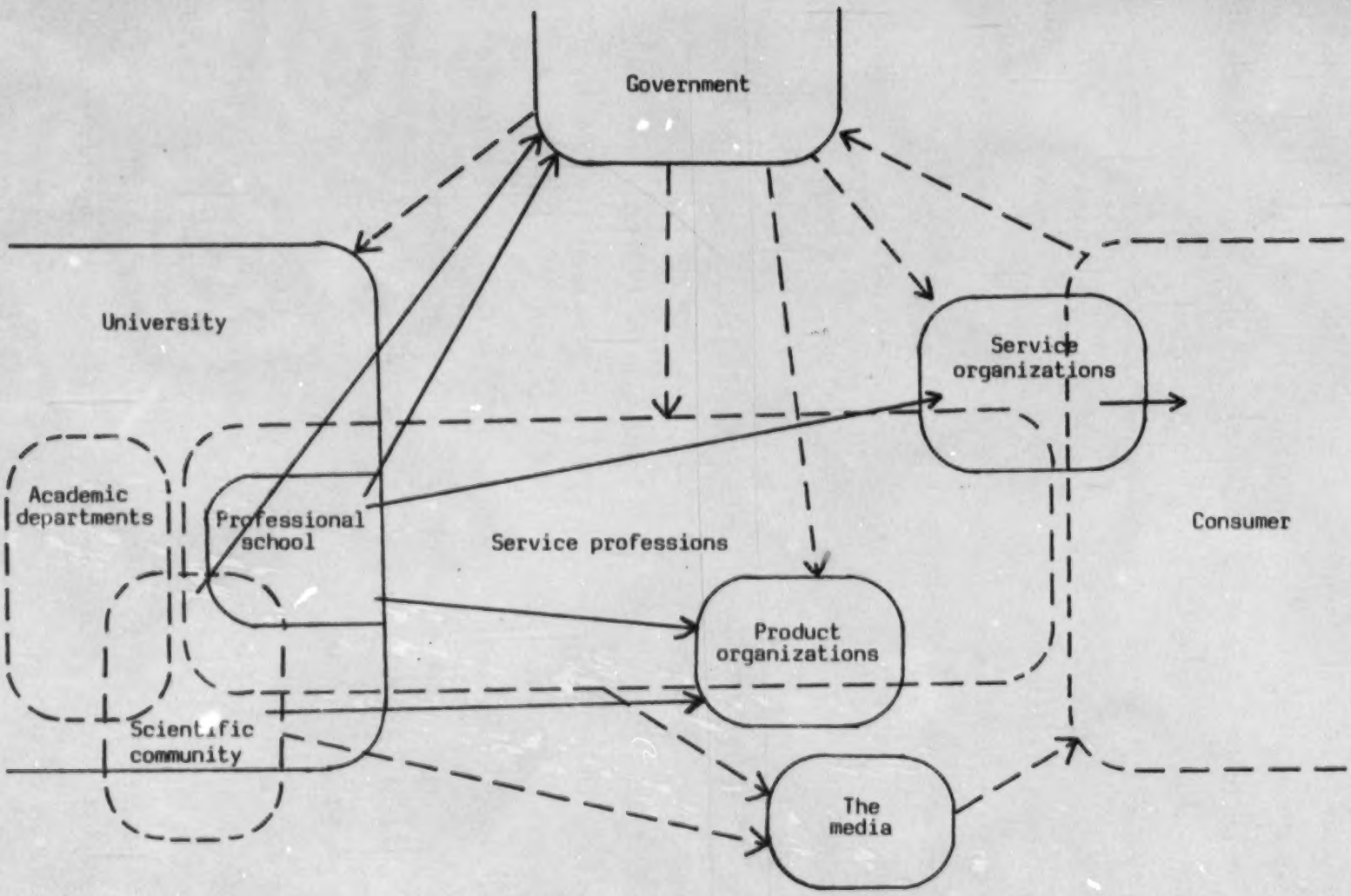

Figure 1. Conceptual Diagram Showing Institutional Relationships of Knowledge/Technology Production and Transfer to Consumers.

particular knowledge-transfer model. (This is similar to what is commonly called a "situational statement" by CES workers).

Prior to this, however, it is imperative to define (or codify) the "units" producing tangible knowledge and technology. We might describe the knowledge production sub-system as the "research world" of the university (Havelock, 1971). Organizationally, these are institutionalized as university departments, scientific societies and research institutes. The division can be exceedingly complex. As an illustrative example, we have taken a medium-sized state land-grant university and listed its relevant internal units in Table 1. Many of these units overlap, especially with regard to the teaching and research sectors. Obviously, many of the individuals who "produce" have joint-type appointments across these various units for the expressed purpose of generally facilitating the "knowledge-transfer" process. This point has ramifications beyond the obvious. It may be that, if indeed academic (teaching) units have less to offer clients or client-systems, this is partially a result of organizational specialization itself. On the other hand, the "internal hierarchy" which de-emphasizes applied efforts and the traditional academic reward structure (basic research publications requisite for promotion and tenure) have produced organizational mechanisms that relegate client-oriented service activity to a less prestigious level.

The internal dynamics of the university are important and should be kept in mind when conceptualizing a knowledge-transfer model. There exists an implicit hierarchy within the university so that policy-oriented ("applied") work is viewed as less distinguished vein by the more central, discipline-oriented, academic departments. Due to focus promulgated to some extent by the (federal) government, these new components are increasingly

Table 1. Codification of Knowledge/Technology - Producing Units of a Hypothetical State Land-Grant University

GROUP I

TEACHING

Agriculture and Home Economics

Agricommunication
Agricultural Economics
Agricultural & Extension Education
Agricultural Engineering
Agronomy
Animal Science
Biochemistry
Dairy Science
Entomology
Food Science & Technology
General Agriculture
Home Economics
Landscape Architecture
Plant Pathology & Weed Science
Poultry Science
Turfgrass Management

Business and Industry

Business Services
Business Research
Accounting
Business Statistics & Data Processing
Economics
Finance
General Business Administration
Management
Marketing
Secretarial Science

Architecture

Arts and Sciences

General Science
Medical Technology
Medical Records Administration
Physical Therapy
Botany
Chemistry
Computer Science
Geology
Geography
Mathematics
Microbiology
Physics
Zoology
Anthropology
Art
Communication
Economics
English
Foreign Languages
History
Journalism
Music
Philosophy & Religion
Political Science
Psychology
Social Work
Corrections
Health-Related Child & Family Services Program
Sociology
General Liberal Arts

Engineering

Aerospace Engineering
Agricultural & Biological Engineering
Chemical Engineering
Civil Engineering
Electrical Engineering
Industrial Engineering
Mechanical Engineering
Nuclear Engineering
Petroleum Engineering
Engineering Mechanics Group

Veterinary Medicine

Education

Educational Psychology
Student Personnel & Counselor Education
Elementary, Secondary & Special Education
Industrial & Occupational Education
Music Education
Physical Education, Health Education & Recreation
Educational Administration & Community College Education
Adult Education

GROUP II

RESEARCH/EXTENSION

Experiment Station

Agricultural Economics
Agricultural & Biological Engineering
Agronomy
Animal Science
Biochemistry
Dairy Science
Entomology
Forestry
Home Economics
Horticulture
Plant Pathology & Weed Science
Poultry Science
Sociology & Rural Life
Veterinary Medicine
Wildlife & Fisheries

Table 1. (continued)

Cooperative Extension Service

Agricultural Economics
Agricultural Engineering
Agronomy
Animal Science
Community Development
Dairy Science
Entomology
Food & Fiber Center
Forestry
4-H Youth Development
Home Economics
Horticulture
Marketing
Plant Pathology
Poultry Science
Rural Development
Land Use Center
Sea Grant Advisory Services
Soil Testing
Special Projects
Veterinary Medicine
Wildlife & Fisheries

GROUP III

OTHER

Division of Computing Affairs

Computer Center
Administrative Data Processing Center
Computer Science
Statistical Services

Office of Research and Graduate Studies

Biological & Physical Science Research Institute
Business Research
Bureau of Education Research & Evaluation
Electron Microscope Center
Engineering & Industrial Research Station
Food Science Institute
Institute for the Humanities
Center for Environmental Studies
Research Center at the National Space Technology Center
Social Science Research Center
Water Resources Research Institute

Boll Weevil Research Lab

Engineering Extension Services

Forest Products Utilization Lab

Research & Curriculum Unit for Vocational- Technical Education

State Chemical Lab

Chemical Regulatory Division
Petroleum Products Division

Institutional Research

Division of Business Services

Forest Experiment Station

Dept. of Agriculture & Commerce
Division of Plant Industry

Institute of Archaeology

State Seed Testing Lab

becoming the intermediaries between "academic" knowledge and "consumable" technology. In disseminating academe's favors, peripheral units (such as research institutes, etc.) are perhaps more internally-organized to interact with client-systems. The academic reward system is also geared toward traditional academic departments (see Blau's excellent discussion, 1973). The importance of these dynamics for knowledge-transfer relations will become more evident when the method is presented in more detail. Explicitly, in operationalizing the linkage between "producers" and "users" where the specific datum is how (or how much) a production unit relates to a consumption unit, the pattern of resulting information is constrained by the organization of either set of units.

Social Organization of Client-Systems

While universities do possess a finite organizational structure, their clients and client-systems, as consumers of knowledge/technology, have no absolute boundaries in principle. Client-systems may also be ad hoc and temporally-bound in the sense that some clients may have relatively constant needs while others may be of the "one-shot" variety. Moreover, clients may also be said to be relatively "organized" and "disorganized," depending on the extent to which they consume university products on a collective or individual basis (Havelock, 1971).

Alternately, to assess producer-user relations we must have some codification of clients and client-systems. There are perhaps many solutions to this situation. One is a "fluid" classification scheme following institutional lines (e.g., private industry, civic organization, state government, etc.). This typology would be revised as necessary depending upon the setting. A second set of categories could be topic area of client

need: energy, health, human services, public works and utilities, and so forth.

A more appealing approach might combine "institutional" client-systems with topical need. For instance, using municipal government as a client-system, a summary classification of principal needs in small cities includes the following: management, budget formulation, assistance with citizens groups, planning, assistance in goal setting and local staff training (Institute for Governmental Administration, 1975: 43). Using "municipal government" as the client-system, these general areas would suffice as individual categories of client needs. If necessary, these summary areas could be broken into finer gradations to facilitate assessments.

These client-system typologies are suggestive but should be modified to fit a given application. Moreover, they should be responsive to changing and new (or newly perceived) clientele.

A Methodology for Assessing Knowledge-Transfer Relations

As indicated previously, it is indeed a complex web of relationships that link the internal units of a university with their (real and supposed) client systems. As we have found in our own, although limited, experiences, knowledge/technology relevant to client systems is often "cloaked" or disguised within the organizational setting of the university. That is, expertise and services desired by a given client may be located within the university in an organizational unit that is not necessarily perceived as offering the appropriate skills to satisfy a particular need. The empirical degree to which this "cloaking" phenomenon occurs is unknown.

Is it possible to determine, systematically, how universities relate to clients and client system? Organizationally, is it feasible to attempt

to map the linkages between knowledge/technology-producing units and real or perceived clientele? In thinking about the abstract linkage of knowledge producers and client systems, we derived the Social Mapping Matrix which quantitatively constructs the communication (or "knowledge-transfer relations") between producing units and client needs.

In its most general form, the Social Mapping Matrix can be illustrated as follows (see Figure 2). The logic of the procedure follows that of an n-way cross-classification (see Babbie, 1975). The basic linkage is that between the university unit (or producer) and the needs of a given clientele (or user). For any given client (e.g., Client A) who has definable needs (e.g., needs A_n), there exists some ascertainable degree of relationship to what each production unit (e.g., Unit A, etc.) has to offer. In each cell of the cross-classification could reside a wealth of information ranging from a simple "yes" or "no" indicating whether or not Unit A has "anything" to offer a particular client need to some quantitative coefficient designed to measure "how much" the unit offers such a need. We are not currently aware of the latter types of human resource accounting measures that may be available, but do not deny that they may be informative under the right circumstances. This cross-classification is repeated over all known clients (and their needs) generating a social mapping of the relations that a given university has with its clients and their definable needs.

It would seem expedient for the institutional research division on a given university campus to implement the SMMA methodology on a campus-wide basis as a means of providing baseline information on community services. Other units, however, may handle it. Although we have not yet done this, a survey design could be used effectively to gather the basic data for

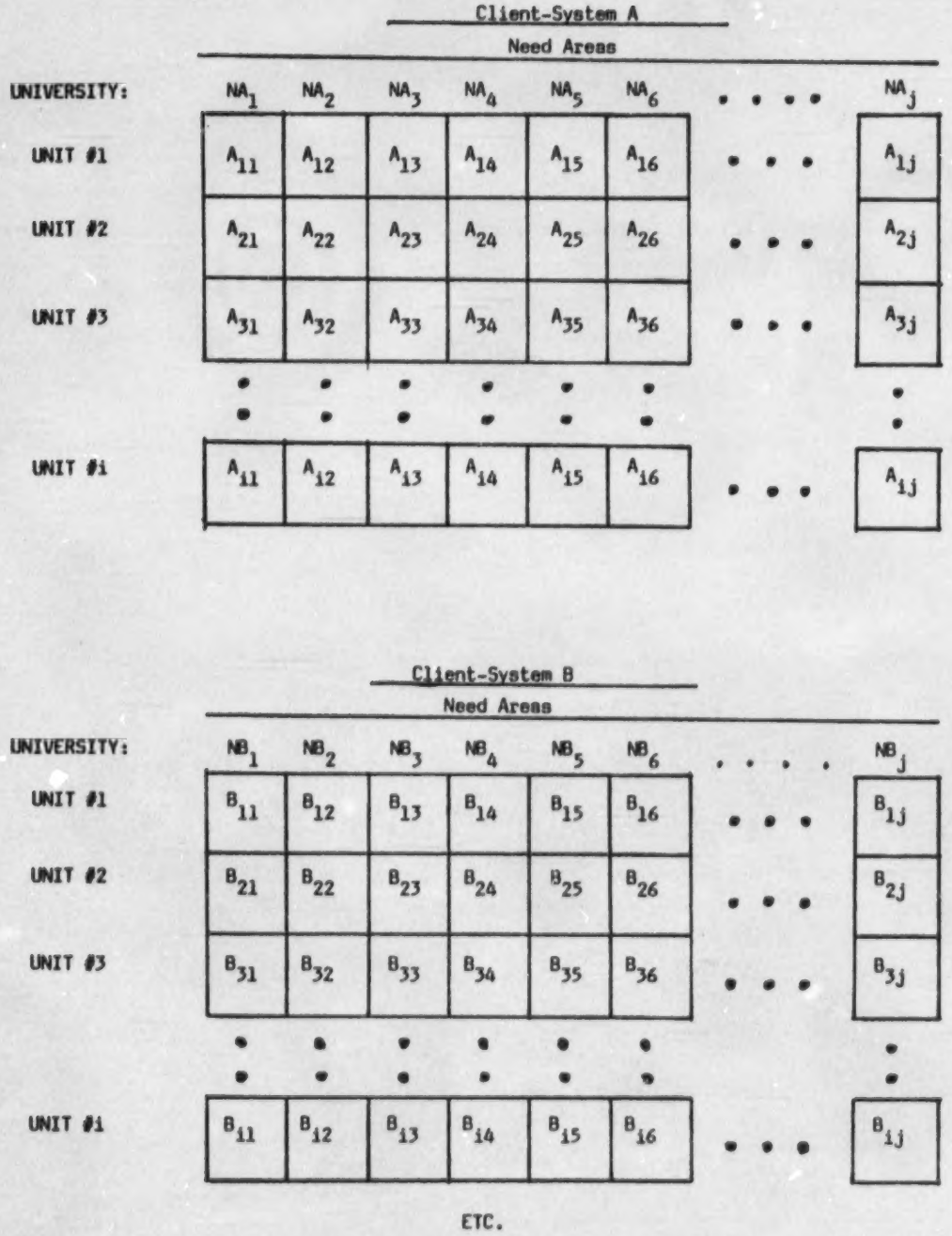
Client-System A
Need Areas
UNIVERSITY:
NA1 NA2 NA3 NA4 NA5 NA6 . . . . NAj
UNIT #1 A11 A12 A13 A14 A15 A16 . . . A1j
UNIT #2 A21 A22 A23 A24 A25 A26 . . . A2j
UNIT #3 A31 A32 A33 A34 A35 A36 . . . A3j
UNIT #i Ai1 Ai2 Ai3 Ai4 Ai5 Ai6 . . . Aij
Client-System B
Need Areas
UNIVERSITY:
NB1 NB2 NB3 NB4 NB5 NB6 . . . . NBj
UNIT #1 B11 B12 B13 B14 B15 B16 . . . B1j
UNIT #2 B21 B22 B23 B24 B25 B26 . . . B2j
UNIT #3 B31 B32 B33 B34 B35 B36 . . . B3j
UNIT #i Bi1 Bi2 Bi3 Bi4 Bi5 Bi6 . . . Bij
ETC.

Figure 2. Social Mapping Matrix Assessment (SMMA) of Knowledge-Transfer Relations.

the assessment on a continuing basis. Faculty expertise could be coded into a "Faculty Resource Data Bank," and an initial typology of client-systems could be surveyed for their needs (and need-areas). Obviously, the latter endeavor would be more difficult to do, but we feel that if it is continually monitored and updated, it would have substantial pay-off in improving the knowledge-transfer process. More details on the specific problems and preferred data collection strategies are needed, however.

The SMMA methodology is also expandable to a state level. That is, with state boards of higher learning being forced through fiscal restraint to seek ways of increased accountability through public service, this type of needs assessment data will be more and more necessary to monitor progress along such lines. Once the "kinks" of data-gathering and implementation are worked out, this cross-classification procedure may be extended to all appropriate institutions of higher learning (see Figure 3).. The implementation of this facet of the SMMA method has broad implications for evaluation of services. This is a point that we feel needs extremely careful consideration with regard to the effective and ineffective uses of such data.

Social Mapping Matrix Assessment: An Example

In this section, a hypothetical but specific example of the SMMA methodology is described and some suggestive alternatives are given. A specific illustration can be found in Figure 4. Using a state land-grant university as a model, the needs of the local municipal government serves as an example. This hypothetical matrix operationalization quite clearly delineates the unit-by-unit producer-user relationship. [For example, it is evident that academic departments (especially liberal arts) have

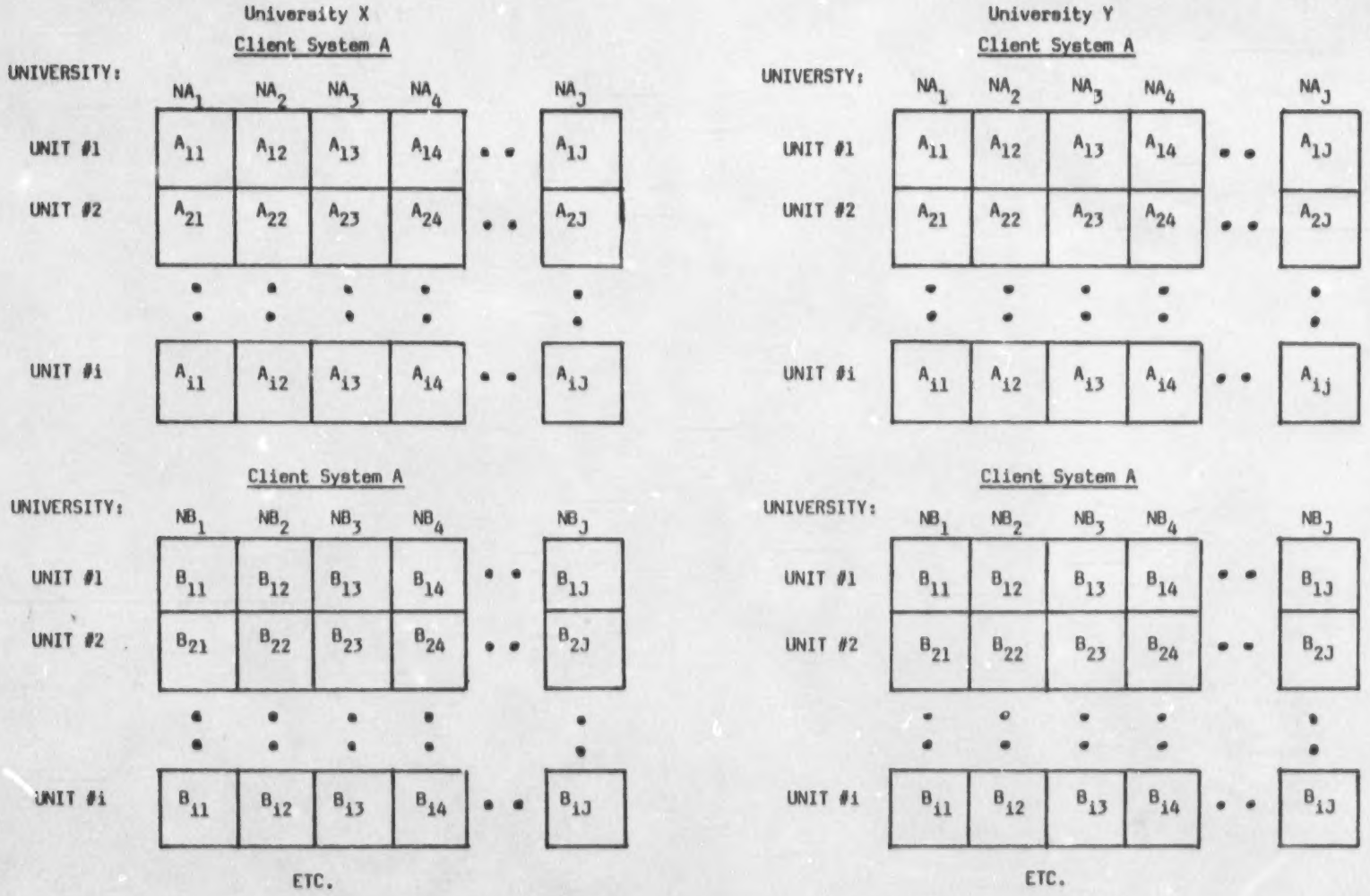
University X
Client System A
UNIVERSITY:
NA1 NA2 NA3 NA4 NAJ
UNIT #1 A11 A12 A13 A14 A1J
UNIT #2 A21 A22 A23 A24 A2J
UNIT #i Ai1 Ai2 Ai3 Ai4 AiJ
University Y
Client System A
UNIVERSTY:
NA1 NA2 NA3 NA4 NAJ
UNIT #1 A11 A12 A13 A14 A1J
UNIT #2 A21 A22 A23 A24 A2J
UNIT #i Ai1 Ai2 Ai3 Ai4 Aij
Client System A
UNIVERSITY:
NB1 NB2 NB3 NB4 NBJ
UNIT #1 B11 B12 B13 B14 B1J
UNIT #2 B21 B22 B23 B24 B2J
UNIT #i Bi1 Bi2 Bi3 Bi4 BiJ
ETC.
Client System A
UNIVERSITY:
NB1 NB2 NB3 NB4 NBJ
UNIT #1 B11 B12 B13 B14 B1J
UNIT #2 B21 B22 B23 B24 B2J
UNIT #i Bi1 Bi2 Bi3 Bi4 BiJ
ETC.

Figure 3. Social Mapping Matrix Assessment (SMMA) of Knowledge-Transfer Extended to Statwide System of Universities.

Client System:
LOCAL GOVERNMENT

UNIVERSITY UNIT:	Need Areas								
I. Teaching	ENGY	CED	HLTH	ENV	HS	PWPU	FSDP	TRANS	POLCJ
Ag-He	No	No	Yes	Yes	No	No	No	No	No
Engineering	Yes	No	No	Yes	No	Yes	No	Yes	No
A & S	No	No	No	No	Yes	No	No	No	No
B & I	No	Yes	No	No	Yes	Yes	No	No	Yes
Educ.	No	Yes	Yes	No	Yes	No	No	No	No
II. Research-Extension	• •	• •	• •	• •	• •	• •	• •	• •	• •
Exp. Sta.	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No
CES	Yes	Yes	Yes	Yes	Yes	No	No	No	No
ORGS	Yes	No	No	Yes	Yes	No	Yes	No	No
	•	•	•	•	•	•	•	•	•
S.C.L.	Yes	No	Yes	Yes	No	No	Yes	No	No
(See Table B)	• •	• •	• •	• •	• •	• •	• •	• •	• •

Source: ISETAP (1979: 5-6)

Legend:
ENGY = Energy
CED = Community and Economic Development
HLTH = Health
ENV = Environment
HS = Human Services
PWPU = Public Works and Public Utilities
FSDP = Five Safety and Disaster Preparedness
TRANS = Transportation
POLCJ = Police and Criminal Justice

Figure 4. Social Mapping Matrix Assessment Hypothetically Applied to Local Government Client System.

less to offer than engineering, business and other technical areas.] Additionally, important potential gaps in the matrix --- where producer expertise is perhaps "cloaked" from the user's perception and vice versa --- can be ascertained and dealt with through public service management channels. Again, it is likely that individuals with appropriate expertise may channel their public service "energies" through service-oriented units where they have joint appointments.

Other information could readily be stored in the cells of the producer-user matrix. Instead of discrete "yes-no" data, some human resource accounting measure would quantitatively assess the level of commitment by any given unit to any given client-system and need area. This option might resolve the potential anomaly of tracking efforts by joint-appointees, for instance.

More pragmatically, if this needs assessment method were effectively implemented, perhaps via a Faculty Resource Data Bank on a university or state-wide basis, the matrix cells could service in a referral mechanism. Using a clearinghouse telephone hotline, individual faculty/staff members' areas of expertise and service could be stored on a computerized version of the SMMA, along with the pertinent contact information for carrying-out the referral. In the case of absolutely no relation (i.e., a "no" in the relevant cell), the "next best" referral within the university, or perhaps to another university, is possible.

It is perhaps at this point that we should raise a parallel issue. That is, the legitimacy of a given unit not having anything to "offer" a given client. The general expectation of being "all things to all people" runs counter to the principle of specialization extant in higher education in general and university departmental organization in particular (see

Blau, 1975). Very complicated issues of accountability are involved in constructing "expected" degrees of relation between university units and client systems. We do not attempt to treat them here.

Summary

In this chapter we have attempted to briefly touch on some of the issues and problems involved in assessing knowledge-transfer relations and broadly outline a general methodology for empirically describing the "producer-user" partnership. The most important aspects of this process involve the dynamics internal to the university and client-systems at large. These two sets of social organization characteristics necessarily constrain any rational model designed to facilitate the linkage between the two.

The Social Mapping Matrix Assessment (SMMA) method was described only in broad and somewhat preliminary terms. The next phase of work on the SMMA lies in perfecting a set of data-gathering techniques which facilitate the continuous monitoring of university "units" and client-systems. The potential for the SMMA to augment to various "Faculty Resource Data Bank" systems now planned (or in operation) was discussed. Finally, the "agnostic" position of an emphasis on empirical description was concluded with an urging for the careful consideration of how such evaluative data should be effectively utilized by policy-makers.

CHAPTER 6

KNOWLEDGE TRANSFER: AN OVERVIEW AND SUGGESTIONS FOR IMPLEMENTATION

According to Perkins (1966: 87-88), the university can justifiably claim an ability to integrate teaching, research, and public service an no other agency "above the level of university." The vitality of the university as the leader in the whole system of higher education can be maintained only as academicians "increasingly conduct themselves as members of a much larger community. . . ."

In this report we have dealt mainly with one aspect of the triple-pronged role of the university, that of public service. Our literature review therefore, has been selective, focusing first on the continuing dialectic between those who favor and those who oppose enlarging the public service role. In our literature search we found no broadly- based survey of faculty and staff opinions about university involvement in public service, but what we did find indicates that there is an opinion favoring a more responsive stance on the part of universities. Support for this position exists within the academic community and among non-academicians who see the university as a source of knowledge needed as data bases for decision-making in various kinds of action programs. There is some feeling that the time has come when the academician and the citizen should "work together in building a more viable education structure" (Budig and Rives, 1972: 73). Enlargement of the public service role is seen by Moe (1978: 24) as a "developing partnership" between universities and the users of research, a view that is reflected in the writings of certain well-known university administrators and others.

In essence, although there is still some reluctance and lack of interest,

even some hostility, in responding to new clientele, the basic question has moved from one of educational philosophy to one of strategy: ways to relate to client systems of various kinds in a continuing relationship that is reciprocally beneficial.

The second form of our review dealt with the question of product, what the university has to offer to client systems. Although Long (1977: 82) listed seven different types of public service activities, we focused on knowledge as the product since most of Long's categories include the transfer of knowledge in one form or another.

We found that the transfer of knowledge as one component of the service role of universities has been the subject of much research, with rural sociologists having made significant contributions in their studies of the diffusion and adoption of new ideas and recommended practices and technologies. We also found conceptual variances with respect to knowledge as the product. The relevance of these variances to our report is reflected in Havelock's (1971: 8-1) question: "What knowledge, what range of phenomena deserve the label 'knowledge' or 'scientific knowledge' or 'innovation'?" Different writers propose different classification schemes, and the transferability of knowledge is discussed at some length. The position we take with reference to types of knowledge is that the ultimate determination of its usefulness within the public service perspective is the acceptability and application by clients.

Not only is knowledge of different types, it can also be transferred, and is transferred, in different ways. With the objective of responding to public sector requests for assistance and of making the university more relevant to societal needs and problems, much attention has been given to knowledge transfer structures and processes. These structures

and processes are treated in the literature as models. Essentially, a model is viewed as a conceptual framework consisting of several basic concepts. As they are described in the literature, knowledge transfer models emphasize different aspects of the knowledge production, development, and dissemination process.

After describing several different knowledge transfer models, we then present a composite model, one which utilizes selected concepts from other models. The basic thrust of our composite model is the concept of university-user partnership as proposed by Moe (1977). Two basic functions of our model are identified. First, there is a clearinghouse function within the university, and second, there is a linking function. The linking function is the key element of the model; that is, institutionalization of university-user partnership depends upon the effective linking of the two entities.

Both of the basic functions of the model can be operationalized through a relatively small organizational structure which we suggest may be identified as the Community Services Office. To facilitate the operation of this Office, we offer a needs assessment methodology, the Social Mapping Matrix Assessment (SMMA). The SMMA can be used for inventory purposes to identify on-campus resources, such as institutes, departments, and other sub-units and the types of services they are capable of providing. A second use would be as a type of catalog for use by university sub-units and by clients. The matrix form of the SMMA allows for different types of information cataloging.

To bring this model to an action stage would require several steps. A necessary initial step would be an analysis of existing university-user contacts. Obviously, responsibility for conducting this analysis must

be assigned to someone; and at many universities the Office of Institutional Research, or its titular equivalent, would seem to be a logical choice for this task. In conjunction with this analysis, steps should be taken to identify the service providing capabilities of the various university sub-units, that is, services they are capable of but are not providing. The SMMA format can be used for these activities.

A second step will require more work, but it is essential. It calls for the identification of potential client systems and at least a partial listing of the services they might need that the university can provide. This step is not viewed as a "once-and-for-all" effort, but as a dynamic building effort extending through time. Again, the SMMA format will be useful for this activity.

A third step in the sequence is the initial contact with potential clients for the purpose of developing university-user partnerships. Some partnerships might be established as a part of the second step operation.

Development of the partnerships will involve discussions between university personnel and potential clients leading toward definitions of mutually agreed upon goals, methodologies and responsbilities. Institutionalization of the partnership arrangement may include a formal statement of agreement between the parties involved, but this statement should be general and flexible. In some instances it might be necessary to prepare specific documents relating to a specific service or university-user task.

From the university perspective, discussion with potential clients and any commitments to clients for providing services must follow clearly stated guidelines. That is, the client system must be made fully aware of university policies and practices relevant to its service role, with an explanation of limitations and restrictions within which the university

must operate.

Implementation of the knowledge transfer model described in this report as a university strategy would necessarily require initiation by administrators with authority to commit university resources.

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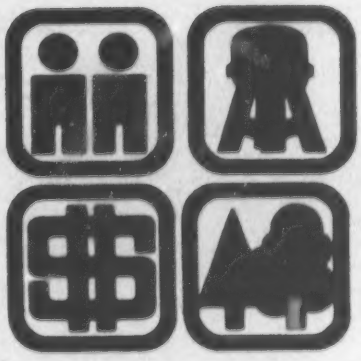

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